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Alberta Agricultural
Research Institute

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2003 • VOLUME III • ISSUE 4 WE BELIEVE IN GROWING ALBERTA'S ECONOMY

Integrated Crop Management – A Holistic Approach

The ICM Strategy is a partnership bringing together disciplines, stakeholders, investors, and organizations at all levels to create a holistic production management system that aims to enhance the positive effects of farming practices on the environment, increase producer returns, and ensure long-term agricultural sustainability.

Dr. George Clayton is one of the key players heading up a committee of researchers, policy-makers, and private industry working on Integrated Crop Management (ICM) in Alberta. The committee, made up of members from the University of Alberta (U of A), the Alberta Research Council (ARC), Agriculture and Agri-Food Canada (AAFC), and Alberta Agriculture, Food and Rural Development (AAFRD), is working to develop a joint strategy that will help increase primary production while considering economic sustainability, environmental health, and consumer confidence. The strategy focuses on outputs, outcomes, and impact.

The committee has identified four major outcomes for research in ICM:

- improved economic, social, and environmental sustainability of crop production systems;
- improved ability of producers to assess and manage production threats;
- improved profitability of crop and livestock interaction systems; and
- improved agribusiness and transfer of knowledge to producers.

According to Clayton, each outcome is characterized by a series of corresponding outputs. These include focusing on legume and cover crops as a means of improving nutrient and water management, developing bio-control agents that mitigate production risks, and genetically improving feed, food, and fibre quality. The ultimate goal of the ICM Committee is to implement all outputs by the year 2015 to ensure increases in environmental health, improved economics of farm households, and an adequate and quality supply of livestock and crops for all levels of the production chain. Says Clayton, "The ICM Strategy provides a template for what we will target to achieve sustainability and wealth creation for rural and urban Alberta."

Alan Hall, Managing Director with AARI, strongly supports a systems approach to cropping and management systems that will ultimately lead to increased profits and reduced risks to farmers. He parallels ICM to the way in which we treat human health, advising that we must get away from the "treat the symptom" mentality and focus on prevention as a means of alleviating resource drain. "If we look at cropping and management systems in an integrated way," says Hall, "we will reap the benefits in the form of reduced input costs for farmers, improved product quality, lower production costs per unit, and risk reductions." In order for ICM to be a success, Hall states, "It's critical that research and development on all levels move forward in unison rather than the somewhat fragmented and single issue perspective that has characterized much of our past."

In order to streamline the process, the U of A, ARC, and AAFRD have recently signed an agreement to share resources, staff, and facilities valued at more than $750 million. The first of its kind in Canada, the agreement lays the groundwork for the creation of the Institute for Food, Agri-Industrial, and Agricultural Sciences, Alberta (IFAASA). The IFAASA will be responsible for the collaborative management and delivery of agriculture, agri-food, and agri-industrial research and education programs.

The ICM strategy is to be completed in January of 2004 following peer review from industry, government, and producers. Says Clayton, "Once the strategy has been accepted as a blueprint for success in addressing the needs of all stakeholders, a meeting will be organized to develop the activities that will contribute to the outputs." These outputs will be the mechanisms through which the proposed outcomes are achieved. The outcomes will in turn create the impact that leads to environmental and economic sustainability.

Battling the Evil Weevil

A relative newcomer to Alberta, the cabbage seedpod weevil is nevertheless one formidable pest that's already spread from Lethbridge to as far north as Red Deer in just six years. Though controlling this destructive insect is proving to be quite an enormous challenge, researchers are battling the bug with incredibly tiny solutions.

Sometimes new insect species find a way into our province, and not always with positive results. Such was the case in 1996 when the presence of the nasty cabbage seedpod weevil was first confirmed in Alberta. Capable of spreading at 60 kilometres per year, this weevil could pose a severe risk to canola and mustard crops across the province.

This tiny insect, small enough to sit on a single canola petal, is considered one of the most devastating pests for cruciferous plants (i.e. canola, mustard, broccoli) in Europe, where it originated, and its presence here immediately raised alarm bells. Alberta Agriculture, Food and Rural Development (AAFRD), with support from the Canola Council of Canada, moved quickly to put together an international team of experts to begin developing an integrated pest management (IPM) strategy to reduce the effects of this pest. Since then, AARI has supported further study into various aspects of the IPM strategy.

Dr. Lloyd Dosdall, Associate Professor with the University of Alberta - AAFRD, is the weevil go-to guy. His research team is hard at work looking into some conventional avenues of control, and a few unique means as well. As with any IPM strategy, the use of cultivars resistant to the pest would be a definite asset. For reasons yet unknown, almost the entire crucifer family is susceptible, with one important exception. "White mustard is resistant to the weevil. The weevil will feed on the flower causing minimal damage, but will not lay eggs within the pod where the real damage occurs," explains Dosdall. When the eggs hatch, the tiny, blind larvae then feed on up to five seeds before emerging and dropping to the ground to pupate.

This weevil resistance in white mustard is driving two of Dosdall's hybrid breeding programs. Both programs are crossing white mustard with canola, one using biotechnological strategies and the other using traditional breeding methods, to isolate and enhance white mustard's resistance to the weevil and transfer it to agronomically suitable canola varieties. Cultural controls in canola, such as altering seeding dates and rates and different forms of tillage, are also being explored as options.

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> Dr. Lloyd Dosdall
> Associate Professor
> University of Alberta
> AAFRD

Perhaps the most intriguing aspect of Dosdall's work is in biological control of the pesky insect. It would seem that in Europe, weevils have natural enemies – tiny wasps. The *Microctonus melanopus* and *Trichomalis perfectus* wasp species attack the adults and larvae respectively. "In the first years, we didn't see any natural parasitization of the weevil, so we began research into importing some of these wasps from Europe," Dosdall recalls. "We were sceptical of importing more non-indigenous species, and fortunately found 13 of Canada's own wasps feeding on the weevil making importation unnecessary."

Most recently, it was discovered that three of these Canadian species of wasps specifically attack the larvae in the pods. "They're really quite nasty little things. The female wasp lays her eggs in the pods, where her own larvae hook onto the weevil larvae and literally suck the life out of them," explains Dosdall.

Further work is necessary to understand the role of these wasps. Dosdall says that before they can be considered a promising control method, research first needs to determine their life cycle and effects on other hosts.

In the meantime, research has shown that early seeding dates and higher seeding rates of canola actually increase the damage resulting from an infestation. Research also shows that the recent drought has reduced the weevil population. "If Alberta can salvage one good thing from this recent drought, it's that the weevil doesn't like the dry weather. The larvae could not burrow in the soil and get picked up by beetles or die on the surface," says Dosdall.

An important part of his research involves transferring the information regarding the weevil to growers. "The crop specialists are out in the field with me doing surveys, scouting, and collecting data on the weevil," says Dosdall, who compiles information into a concise presentation for circulation to the crop specialists. They, in turn, deliver it to those who need it most – the producers. Producers can count on access to the most recent weevil number, to determine what course of action, if any, to take.

With the ongoing work into cultural and biological control research, Dosdall hopes the recent decrease in population due to the dry weather will slow the spread of this pest and give Alberta a much needed head start on this evil weevil.

Bison on the Horizon

The bison industry is just one aspect of the diversified meat production sector in Alberta. Existing studies, funded by AARI, indicate that factors from health to curiosity may be the driving forces behind current consumer interest in alternative meats, both in Alberta and abroad. A new study is poised to determine whether present and future markets exist for alternative meats in Canada.

It's not the same old thing for dinner anymore. Consumer interest in and acceptance of alternative meats such as bison, elk, wild boar, deer, turkey, ostrich, goat, and rabbit are on the rise. According to two recently completed studies on bison production in Alberta, and a study currently underway on alternative meats, Alberta is poised for even greater commercial success in alternative livestock production – both in Alberta and overseas.

As with many other alternative meats, bison is valued for its low calorie, low cholesterol meat. Bison is dark-coloured, with less intramuscular fat and a rich taste attributable to a nearly 30 per cent higher protein level than other red meats. As well, bison are raised in a natural rangeland environment and thus are less prone to stress-related meat quality defects.

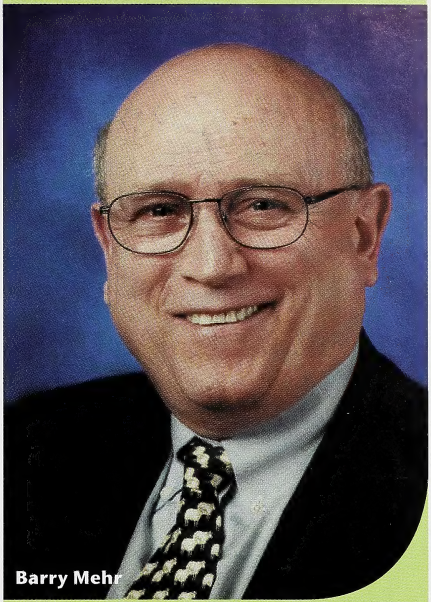
In a study, funded by AARI, on the factors that affect the quality of bison meat researchers Mick Price and Jennifer Janz examined post-mortem technologies designed to improve the eating quality of bison meat. Despite the positive qualities of bison meat, Janz feels there is a need for increased collaboration within the bison industry. "Marketing efforts have been inconsistent so far, making it difficult for consumers to find a steady supply." Price and Janz concluded that further consumer education on the health profile of bison will support creative meat processing and marketing techniques, and will enhance consumer perception of this meat.

Another AARI-funded study, "European Opportunities for Bison Meat", illustrates that Europe offers great market potential for Alberta bison. Europe has a large population, a relatively high average income, and a history of hunting and consuming alternative fowl and game. Europeans also have a fascination for Canada's pristine rangelands and aboriginal heritage. These factors, argues study author Kevin Gillis, are favourable tools that can be used when marketing bison meat. However, cautions Gillis, exporters must consider the following: European customers have different cutting specifications and they demand that their meat remain free of growth promotants and other additives.

A new study, funded by AARI and the Diversified Livestock Fund of Alberta, will address the marketing inconsistencies to which Janz refers, as well as the production specifications that currently limit the growth of the alternative livestock industry. Dr. Kevin Chen, at the University of Alberta, is building on the latter two studies by proposing to document the incentives and barriers that currently motivate or deter people from consuming alternative meats. Based on these results, Chen will create a consumer profile that will help develop a marketing strategy for the Alberta alternative livestock industry. The study will focus not just on bison, but also on ostrich, emu, and elk.

Chen's study has enormous implications as a new framework would benefit all stakeholders in the alternative livestock industry. Once the results of Chen's study are complete, the alternative meat industry will be setting the dinner table for a whole new group of consumers.

Board Profile



Barry Mehr

> "I hope to be able to assist AARI in supporting the required research to move our industry as quickly as possible to annual sales of $10 billion primary and $20 billion value-added."

As the recently appointed Deputy Minister of Alberta Innovation and Science, and CEO of the Alberta Science and Research Authority (ASRA), Barry Mehr will play a key role in ensuring the strength of Alberta's research and development activities. In his new role, he will also serve on the AARI Board of Directors.

Previously, Mehr served four years with Alberta Economic Development, the latter two as Deputy Minister, and 23 years with Alberta Agriculture, Food and Rural Development. He graduated from the University of Toronto with a BA (Food Chemistry) and prior to coming to the Alberta government, he worked for Agriculture Canada and Swift Canadian Co. Ltd., where he held several management positions.

Mehr is looking forward to participating in the work of the AARI Board. "I hope to be able to assist AARI in supporting the required research to move our industry as quickly as possible to annual sales of $10 billion primary and $20 billion value-added," he says.

Expanding Core Strengths

Alan Hall, Managing Director of AARI, welcomes a new member of the Funding Consortium – one that expands the core strengths of the group.

Alan Hall

Autumn seems to be the perfect time to reflect on the months just past. Farmers are reaping the rewards of their efforts and considering what worked and what didn't. This year, BSE, drought, grasshoppers, and lower prices presented major challenges. Just as farmers, known to be tough, resilient, and tenacious, play an instrumental role in overcoming these issues, so too does agricultural research and development. We all need to work together to overcome the many hurdles our agriculture community faces.

With the new research and development funding cycle upon us, I too have been thinking about accomplishments. I am struck by how effective the Consortium has become at collaborating to achieve big picture goals. Although each of the partners has a history of fostering research and development in their own niche, our ability to work together to ensure pooling of efforts and resources to address our common goals is growing steadily.

Years ago, a farmer with a team of four horses pulling together did more than the farmer with one horse. There is no doubt that we can maximize our effort by using that same team approach. There has been a learning curve attached to this new way of doing business, but we have achieved a great deal through joint effort and there is every reason to believe that we will continue to refine the approach and the process, reaching more of our goals as we do so.

There is great satisfaction in our accomplishments to date. At the same time, each of the partners continues to serve more specifically that segment of the industry to which they are attached. I now think of the Consortium as a critical mass which has become a magnet: we are attracting others who want to play a role in creating a better economy and lifestyle for all Albertans. This critical mass is not confined to funders. We have built close relationships with our research and industry associates as well, and it is encouraging to see how it all comes together as we address the challenges before us and capture new opportunities.

Most recently, the Funding Consortium welcomed a new member, one with a core strength which brings us credibility in the critical areas of climate change, and more generally, the environment. We are pleased to have Climate Change Central join the Funding Consortium, and we look forward to further developing the partnership with them. Their involvement, guidance, and efforts on climate change and the environment specifically strengthens the Funding Consortium's ability to form sector alliances around research, development, and technology transfer initiatives important to the continued development of Alberta's agricultural industry.

As we look back over the past year, we can be gratified with what we have accomplished. The funding model we have developed in the Funding Consortium is being held up as a new paradigm. This was made possible by the collaborative effort of a number of organizations and individuals who were willing to think outside the box. As we look to the future, we recognize that future success hinges on further collaboration – among funders, perfomers, and the private sector.

The harnessing of R&D capacity which is strongly aligned with industry needs has been key to our success. If we are to double agricultural research and development capacity in Alberta by 2008, we will have to focus on ways to attract new investment that will join us in our drive toward a sound economic future.

I look forward to our continued collaborative success.

Alan Hall
Managing Director, AARI

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When the first outbreaks of cabbage seedpod weevil occurred in the canola fields of southern Alberta in 1999 and 2000, they were responsible for crop losses worth $5 to $8 million per year.

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Originally named "wapiti", meaning pale rump, elk, the second largest member of the deer family are extremely efficient at converting their food. Three elk cows' feed intake is the same as that of one beef cow.

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Tennis racket strings can be made from the intestines of sheep while paintbrushes can be made from the ear hair of a cow or camel. And, for all you curling fans, curling brooms can be fabricated with horse or pig hair.

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Submissions and feedback are welcome.

Alberta INNOVATION AND SCIENCE

ASRA Alberta Science and Research Authority